electrode **105** and the second electrode **110** (see FIG. **1**). Accordingly, the distance d between the reflecting cells **115***a* can be controlled by changing the voltage V applied to the electroactive polymer layer **107** and the distance t between the first electrode **105** and the second electrode **110**. As the voltage V increases, the distance d between the reflecting cells **115***a* increases, and as the distance t between the first electrode **105** and the second electrode **110** increases, the distance d between the reflecting cells **115***a* decreases. If the electroactive polymer layer **107** is thick, the electroactive polymer layer **107** is strained only when a high voltage is applied. Accordingly, the electroactive polymer layer **107** should have a thickness ranging from 0.001 to 100 μm.

[0048] FIG. **4**C illustrates the state where the electroactive polymer layer **107** strained and the reflecting cells **115***a* are accordingly extended when a second voltage V**2** greater than the first voltage V**1** is applied to the electro active polymer layer **107**. The degree of strain of the electroactive polymer layer **107** when the second voltage V**2** is applied to the electroactive polymer layer **107** is greater than the degree of strain of the electroactive polymer layer **107** when the first voltage V**1** is applied to the electroactive polymer layer **107**. Accordingly, the degree of deformation of the reflecting cells **115***a* when the second voltage V**2** is applied to the electroactive polymer layer **107** is greater than the degree of deformation of the reflecting cells **115***a* when the first voltage V**1** is applied to the electroactive polymer layer. As the degree of deformation of the reflecting cells **115***a* increases, a larger amount of light which passes between the blocking cells **118***a* is reflected by the reflecting cells **115***a* and is reflected by the reflective unit.

[0049] FIG. **5** is a cross-sectional view illustrating a modification of the reflective unit of FIG. **1**. The reflective unit of FIG. **5** is different from the reflective unit of FIG. **1** in that sub-blocking cells **116** are disposed between the reflecting cells **115***a*. The sub-blocking cells **116** may be disposed to prevent external light from passing between the blocking cells **118***a* from being reflected between the reflecting cells **115** when black is to be displayed.

[0050] A flexible display according to the present invention employs the reflecting unit to display gradation. In other words, the flexible display adjusts the reflectance of light in order to display gradation using an electroactive polymer that is strained when a voltage is applied thereto. The flexible display includes a plurality of pixels, and the plurality of pixels emit different light according to input signals. The flexible display creates an image by reflecting external light, such as sunlight or ambient light.

[0051] FIG. **6** is a cross-sectional view of a pixel of a flexible display according to an embodiment of the present invention. Referring to FIG. **6**, the pixel includes a first substrate **100**, an electroactive polymer layer **107** disposed on the first substrate **100**, a light reflecting unit **115** disposed on the electroactive polymer layer **107**, and a light blocking unit **118** disposed over the light reflecting unit **115**. An insulating layer **103** may be disposed between the first substrate **100** and the electroactive polymer layer **107**. A second substrate **123** may be disposed over the electroactive polymer layer **107**. The second substrate **123** may be formed of a transparent material, such as polyethylene terephthalate (PET) or glass, through which light can be transmitted.

[0052] As described with reference to FIG. **1**, gradation of each pixel can be displayed by controlling a voltage applied to the electroactive polymer layer **107** to control the amount of light reflected by the light reflecting unit **115**. That is, desired gradation for each pixel can be displayed by controlling a misalignment between the light reflecting unit **115** and the light blocking unit **118**.

[0053] FIG. **7** is a cross-sectional view of a modification of the flexible display of FIG. **6**. The flexible display of FIG. **7** is different from the flexible display of FIG. **6** in that a first anti-reflection layer **121** is disposed under the second substrate **123** and a second anti-reflection layer **125** is disposed over the second substrate **123**. The first anti-reflection layer **121** and the second anti-reflection layer **125** prevent external light from being reflected before reaching the light reflecting unit **115** in order to increase the amount of light incident on the light reflecting unit **115**.

[0054] Since the electroactive polymer layer **107** has a rapid response to an input signal, there is no difficulty in producing a moving picture. Since the degree of strain of the electroactive polymer can be easily adjusted according to a voltage applied thereto and the reflectance of light can be adjusted according to the degree of strain due to the voltage, contrast can be improved.

[0055] As described above, the reflective unit and the flexible display employing the reflective unit according to the present invention displays gradation and an image by controlling the reflectance of external light according to the strain of the electroactive polymer layer. Since the light reflecting unit, which is disposed on the electroactive polymer layer, is misaligned with the light blocking layer, which is disposed to face the light reflecting unit, when the electroactive polymer layer is strained, contrast can be improved by controlling the reflectance of light by controlling the amount of strain. Also, since the electroactive polymer layer has a short response time, a moving picture can be easily produced.

[0056] While the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the following claims.

What is claimed is:

1. A reflective unit comprising:

an electroactive polymer layer which becomes strained when a voltage is applied thereto by an electrode;

a light reflecting unit disposed over the electroactive polymer layer, the light reflecting unit comprising reflecting cells which reflect external light and are spaced apart from one another wherein a distance between the reflecting cells changes according to a strain of the electroactive polymer layer; and

a light blocking layer disposed over the light reflecting unit, the light blocking layer comprising blocking cells which absorb light and are spaced apart from one another.

2. The reflective unit of claim **1**, wherein the reflecting cells are reflecting micro mirrors.

3. The reflective unit of claim **1**, further comprising sub-blocking cells disposed between the reflecting cells, which prevent external light from being reflected between the reflecting cells.

4. The reflective unit of claim **1**, wherein the light reflecting unit and the light blocking unit are disposed in a same medium.

5. The reflective unit of claim **4**, wherein the medium is formed of a low reflective material.